

PATENT CLAIMS

- 5 1. A manipulator-guided gripping device (1) for workpieces, especially body parts in the body shell, wherein the gripping device (1) has a plurality of said device parts (6, 7, 8) and a safety means (9) for detecting changes in geometry, **characterized in that** the safety means (9) has at least one deflectable safety device (10) at the device parts (6, 7, 8).
- 10 2. A gripping device in accordance with claim 1, **characterized in that** the deflectable safety device (10) is arranged at a junction point (23) between the device parts (6, 7, 7', 7'', 8).
- 15 3. A gripping device in accordance with claim 1 or 2, **characterized in that** the deflectable safety device (10) has at least two said safety device parts (11, 12) that are mounted such that they can deflect along one or more axes in case of overload.
- 20 4. A gripping device in accordance with claim 1, 2 or 3, **characterized in that** the safety device parts (11, 12) are connected to one another by clamping connection and frictional connection.
5. A gripping device in accordance with claim 1, 2 or 3, **characterized in that** the safety device parts (11, 12) are connected to one another in a positive-locking manner by at least one said deflectable locking element (13).

6. A gripping device in accordance with one of the above claims, **characterized in that** the safety device parts (11, 12) are connected to a device part (6, 7, 7', 8) each.

7. A gripping device in accordance with one of the above claims, **characterized in that** the locking element (13) is arranged between the safety device parts (11, 12).

8. A gripping device in accordance with one of the above claims, **characterized in that** the locking element (13) is held with an elastic clamping element (20).

9. A gripping device in accordance with one of the above claims, **characterized in that** the locking element (13) and the clamping element (20) are set to a force that holds the safety device parts (11, 12) during normal operation.

10. A gripping device in accordance with one of the above claims, **characterized in that** the safety device parts (11, 12) are designed as a sphere (15, 15') and as a socket (14, 14') surrounding same.

11. A gripping device in accordance with one of the above claims, **characterized in that** the sphere is designed as a joint ball (15) and the socket is designed as a straight tube section (14).

12. A gripping device in accordance with one of the above claims, **characterized in that** the sphere is designed as a ring-shaped collar (15') with a spherical outer side and the socket is

designed as a calotte (14') surrounding same with an inner side rounded in a complementary manner.

13. A gripping device in accordance with claim 12, **characterized in that** the collar (15') and the calotte (14') surrounding same have essentially the same width.

14. A gripping device in accordance with one of the claims 1 through 9, **characterized in that** the safety device parts (11, 12) are designed as said disk mounts (16, 17) with parallel working surfaces.

15. A gripping device in accordance with one of the above claims, **characterized in that** the safety device parts (11, 12) have an adjusting means (33) for reproducible mutual positioning.

16. A gripping device in accordance with one of the above claims, **characterized in that** the safety device parts (11, 12) have one or more said detectors (24), which detect and signal deflections of the safety device parts (11, 12).

17. A gripping device in accordance with one of the above claims, **characterized in that** the detector (24) is arranged eccentrically in relation to the central axis (38) of the safety device parts (11, 12).

18. A gripping device in accordance with one of the claims 1 through 16, **characterized in that** the detector (24) is arranged centrally in the central axis (38) of the safety device parts (11, 12)

and is designed as a part of the adjusting means (33).

19. Deflectable safety device in accordance with claim 18, **characterized in that** the detector (24) has a pressure piece (44), which is mounted in an elastically movable manner in an end-side tube section (43) of the shaft (37) and whose said projecting head part (45) engages a mount (47) at a projection (39) of the other safety device part (11) in a positive-locking manner, wherein a microswitch (48) is arranged at the contact point.

20. A gripping device in accordance with one of the above claims, **characterized in that** the detectors (24) are connected to a process control (26).

21. A gripping device in accordance with one of the above claims, **characterized in that** the gripping device (1) has a frame (4) with one or more said gripping or clamping elements (6) and with a docking point (5) for connection to a mechanical manipulator (2), especially a multiaxial industrial robot.

22. A gripping device in accordance with one of the above claims, **characterized in that** the frame (4) has a plurality of said frame tubes (7, 8).

23. A gripping device in accordance with claim 15, **characterized in that** the frame tubes (7, 8) are divided, wherein a deflectable safety device (10) is arranged between the tube sections (7', 7'').